University of Agronomic Sciences and Veterinary Medicine of Bucharest
Faculty of Horticulture

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Preliminary research on the selection of local and foreign fig genotypes (*Ficus carica* L.)

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I.Introduction

1.1. Taxonomy

The fig tree (*Ficus carica* L.) is native to Midle East (Caria - Turkey, Mesopotamia, Palestina, Egipt), now is spread out in all mediteranean area and throught the world, where it has found good conditions to grow and develop fruits. (China, Japonia, Australia, America Latina, etc.).

In contrast to other cultivated species, the fig tree has a great genetic variability, because unlike other species, the fig tree has not been subjected of intensive breeding programs.

The American horticulturist I. Condit described over 600 fig genotiypes, many of them producing high quality fruits.

- Scientific name: *Ficus carica*
- Common name: Smochin
- Genus: Ficus
- Family: Moraceae
- Order: Rosales
- Clade: Magnoliopsida
- Increngatura: Tracheobionta
- Regnul: Plantae

1.2. Religion and legends

The fig tree is present in all religions and cultures of the world.

It is said that Adam and Eve sinned by bitting a fig, the apple not being present in those times in the East. They covered themselves with fig leaves.

In India, Temple Mahabodhi marks the place where Buddha received ilumination under a fig tree (*Ficus religiosa*).

Cleopatra was bitten by a viper that was in a bascket of figs, her favorite fruit.

The she wolf fed Romulus and Remus under a fig tree.

The fig contribuited to the Romans' decizion to destroy Carthage.

1.3. The importance of fig and fig tree

- **Nutrition**

•Hygenic and cosmetics

•Wood for decorations

• Landscape

1.4. Chemical composition

The figs contain 78-84% water, carbohydrates– invert sugar (17,5%), protide, organic acids: citric, galic, clorogenic, syringic, oxalic, quinic, malic, succinic, acetic, cellulose. Mineral salts: ca, mg, cu, mn, br, K, Fe, Na, carotenoid pigments, anthocyanins pigments, vitamin: A,B1,B2,B3,B5,B6,K,PP), enzymes (ficine, lipodiastaza- enzyme analogous to pancreatic juice), pectina, fibers, fatty acids (omega 3 and omega 6), phytosterols, tryptophan.

1.5. Therapeutical action

- High blood pressure
- Fragile bones
- Frequent Insomnia
- Difficul digestion, constipation
- Extra pounds
- Skin conditions, deshydrated skin
- circulatory and renal disorders
- Tonsillitis, stomatitis, colitis, gastritis
- Vitiligo (latex)
- Diabetes (leaves)
- Irregular menstruation
- Prostate
- Physical and mental asthenia
- Antiinflamatory effects
- Corns, boils, warts (latex)
- Antioxidant
- Antibacterial (Staphylococcus aureus, E.coli-fruct ; S.anginosus, Porphyromonas gingivalis-fruze; Bacilus cereus, S. Epidermidis-latex)

1.6. Contraindications

The figs contain oxalates which cause loss of Ca and Fe. Not recommended, in excess, for young children, pregnant women and anemic people.

I.7. Main objectives

Selection of some fig (*Ficus carica* L.) genotypes with superior pomological characyeristics and adapted to climaterical conditions in Romania

1.Selection of some valuable genotypes with important proprieties such as: desease resistant, crack resistant, superior organoleptic proprieties;

2. Testing and implementation of a new cultivation technology for fig plantations with high planting density

II. Materials and Methods

- **II.1. The natural framework of the areas where the reseach is carried out**
- **II.2. Vegetal material**
- **II.3. Growth tehnology**
- **II.4. Laboratory equipment/analysis methods**

II.1.The natural and geografical framework of the areas where the research is carried out

The fig tree has high requirements regarding temperatures. It is sensitive to frost and temperatures below -16ºC are dameging the plant, but it stands temperatures up to 40ºC. It has moderate requirements regarding warter and grows well on well-aerated, dry soils that are rich in limestones, even stony soils. Favorable areas in Romania for fig tree to develop fruits are: Mehedinti (Svinita), Dolj, Dobrogea.

Because we want to know the adaptability of the fig tree in other parts of the country, the areas where the research is carried out are:

- Experimental field of the Faculty of Horticulture, Bucharest
- Moara Domneasca Farm, Ilfov county
- Istrita Tree Nursery and Farm, Buzau county

II.1.Experimental field of Facultaty of Horticulture Bucuresti

The experimental field of the Faculty of Horticulture, Bucharest is located in the northen part of the capital, geographical coordinates 44°28’10” lat.N and 26°04’00” long.E, at 78 m altitude. Bucharest borders with: Câmpia Titu – Gheorghița at N, Câmpia Bărăganul Moștiștei at E and SE, Ialomita River at NE, Arges Valley at V and SV. The climate is temperate-continental, with cold winters and hot, dry summers.

The annual average temperature is 10,5ºC, the annual average of precipitations sums up to 550-600 mm.

II.1.2. Moara Domneasca Farm, Ilfov county

Moara Domneasca Farm, is part of Beciugatele Research Center, geographical coordinates 44º30’ lat. N and 29º31’ long.E, at 90 m altitude. It borders with N-E Bucuresti at SV, Ganeasa Vilage at V and Afumati Vilage at E.

The annual average temperature is 10,4ºC, the number of days with temperatures below 0ºC (frost days) is 114.

II.1.3. Istrita Tree Nursery and Farm, Buzau county

Istrita tree nursery is located at 45º29‘ lat .N and 26º34’ long.E, at134 m altitude, Sahateni Vilage, Buzau county. The climate is semi-humid, quite warm. The annual average temperature is 11,3ºC, the annual average precipitations sums up almost 500 mm.

It is a plain area, under Istrita Hill (Subcarpathians) and connectes this region with Campia Baraganului. Buzau Town is 25 km far.

II.2. Vegetal material

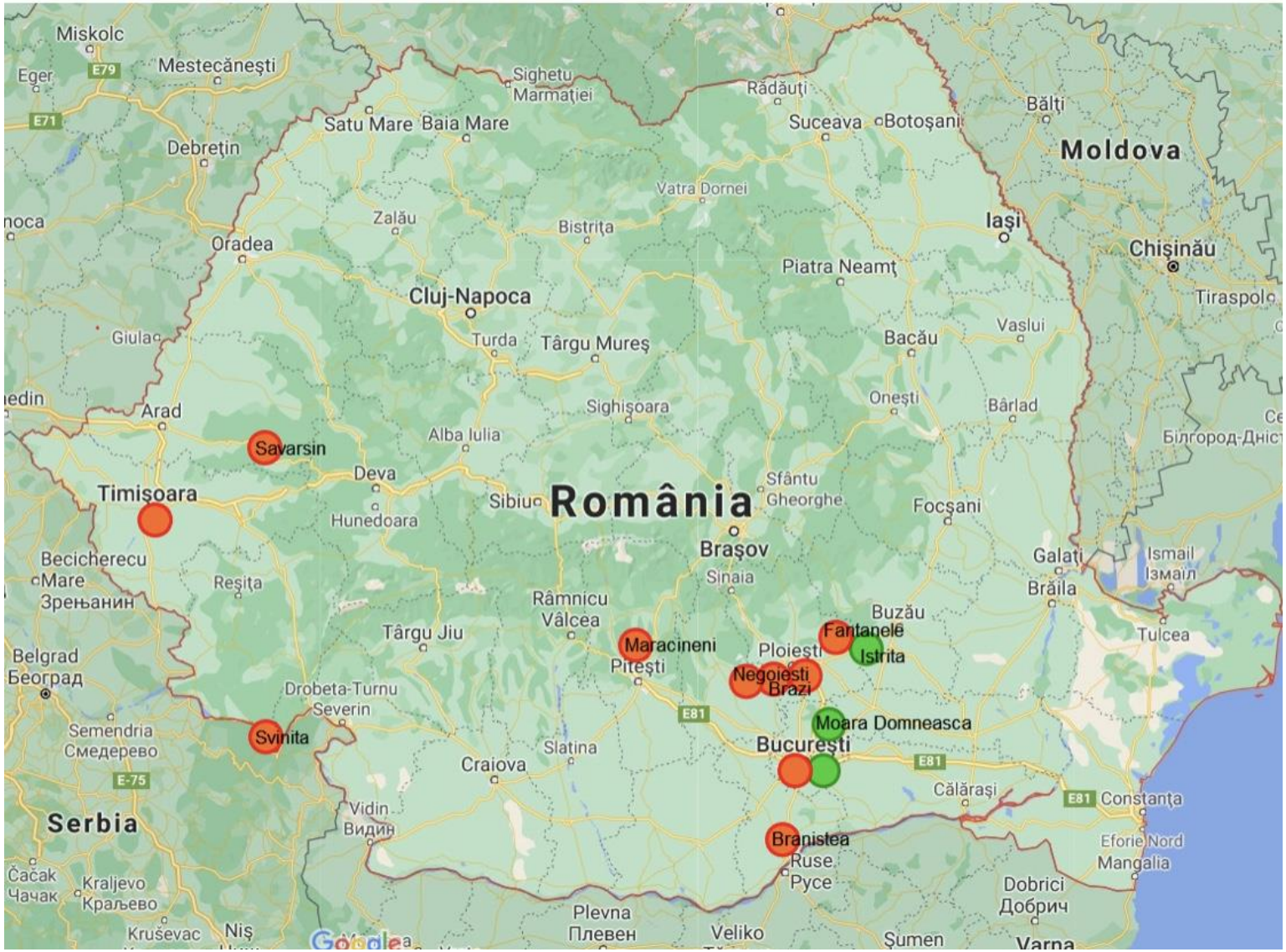
The fig trees, on their own roots, come through cuttings from the figs grown in the country and abroad. The cuttings were rooted in the vegetation house of the Faculty of Horticulture Bucharest.

Nr	Name	Origin
24	Galben mare	Branistea, GR
39	Melo nero	Italy
5	Stork	Bucharest
28	Brazi	Brazi, PH
36	Bifera bianco	Italy
40	Awitato	Italy
19	1 Mai	Bucharest
14	Viscool	Maracineni, AG
38	Bianco Etna	Italy
37	Natawa	Italy
34	Rot negru otiman	Svinita, CS
41	Fantanele PH	Fantanele, PH
63	Irak 1	Kerkut, Irak

Nr	Name	Origin
67	Bianco Sicilia	Italia
142	Passuluna nero	Italy
69	Cilento nero	Italy
7	Smochin negru	Ploiesti, PH
50	Savarsin	Savarsin, AR
	Fiorone Etna	Italy
66	Fig primizia	Italy
3	Negoiesti 01	Negoiesti, PH
8	Piata Obor	Bucharest
26	Dr. Constantines	Bucharest
18	Ploiesti nr.1	Ploiesti, PH
17	Oli Timisoara	Timisoara, TM
	???	

Location on the map of Romania:

- of the origin areas of the figs
- of the areas where research is carried out



Varieties

24 Galben mare

26 Brazi

5 Stork

14 Viscool

40 Awitato

38 Bianco Etna

34 Rot negru otiman

41 Fantanele Ph

142 Passuluna nero

69 Cilento nero

7 Smochin negru

50 Savarsin

26 Dr.Constantinescu

8 Piata Obor

17 Oli Timisoara

18 Ploiesti 1

66 Fig Primizia

19 1 Mai

3 Negoiesti 1

??? R3P13

II.3. Growth technology

A new cultivation technology for high density fig plantations is being tested for implementation.
The planting distance is: 4m between rows and 0,75m between plants.
The plants were planted obliquel and covered along their entire length with soil, so at every node will apear a new shoot that will get rooted and the plant row will be like a fig hedge.

Maintenance

- in the mid June the plant were given complex fertilizer
- in the first decade of July, the weeds on the rows of fig were weeded
- in the first decade of July, the plants were mulched with straw and sand

- weeds between rows were trimmed whenever needed
- watering was done whenever needed, depending on the outside temperatures and precipitations
- no phytosanitary treatments were done
- during dormancy the branches are cut at 20 cm high and the row will be covered with leaves and sawdust to protect the plants from winter low temperatures.

II.4. Laboratory equipmentand analysis methods

Analytical balance

Fruit weight

Caliper

Shape index

Reflectometer

Brix % (TSS), Glucose, Fructose

III. Results and discussions

Characterization of certain fig genotypes

24 Galben mare

28 Brazi

40 Awitato

5 Stork

38 Bianco Etna

14 Viscool

19 1 Mai

34 Rot negru otiman

41 Fantanele Ph

142 Passuluna nero

66 Fig Primizia

26 Dr.Constantinescu

???R3P13

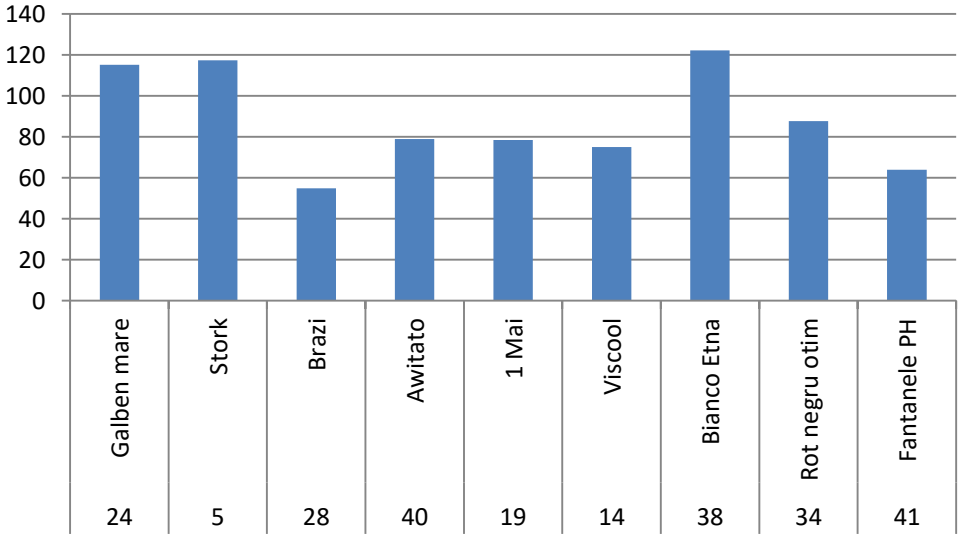
Harvest schedule

Month			August 2020			September 2020			Octomber 2020		
	Nr.	Genotype	Decade I	Decade II	Decade III	Decade I	Decade II	Decade III	Decade I	Decade II	Decade III
R4	24	Galben mare									
	5	Stork									
	28	Brazi									
	40	Awitato									
	19	1 Mai									
	14	Viscool									
	38	Bianco Etna									
	34	Rot negru otim									
	41	Fantanele PH									
R3	Nr.	Genotype									
	67	Bianco Sicilia									
	142	Passuluna nera									
	69	Cilento nero									
	7	Smochin negru									
	50	Savarsin									
	66	Fig Primizia									
	3	Negoiesti 01									
	8	Piata Obor									
	26	Dr. Constantinescu									
	18	Ploiesti 1									
	17	Oli Timosoara									
		???									

Growth vigor R4

Number	Genotype	Total sum (cm)	Nr. of branches	Average length of shoots(cm)
24	Galben mare	2993	26	115.11
5	Stork	5985	51	117.35
28	Brazi	1752	32	54.75
40	Awitato	2602	33	78.82
19	1 Mai	2275	29	78.44
14	Viscool	2850	38	75
38	Bianco Etna	3175	26	122.11
34	Rot negru otim	1928	22	87.63
41	Fantanele PH	1660	26	63.84

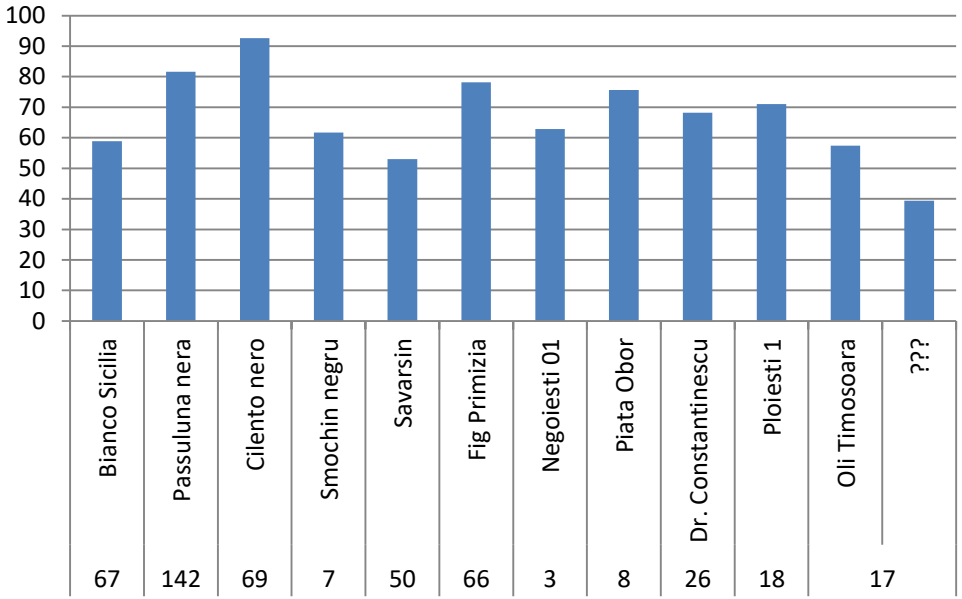
Average shoot lenghts (cm)



Growth vigor R3

Nr.	Genotype	Total sum (cm)	Nr. of branches	Average length of shoots (cm)
67	Bianco Sicilia	412	7	58.85
142	Passuluna nera	980	12	81.66
69	Cilento nero	556	6	92.66
7	Smochin negru	802	13	61.69
50	Savarsin	954	18	53
66	Fig Primizia	1016	13	78.15
3	Negoiesti 01	943	15	62.86
8	Piata Obor	1211	16	75.68
26	Dr. Constantinescu	818	12	68.16
18	Ploiesti 1	782	11	71.09
17	Oli Timosoara	517	9	57.44
	???	394	10	39.4

Average shoot lenghts (cm)

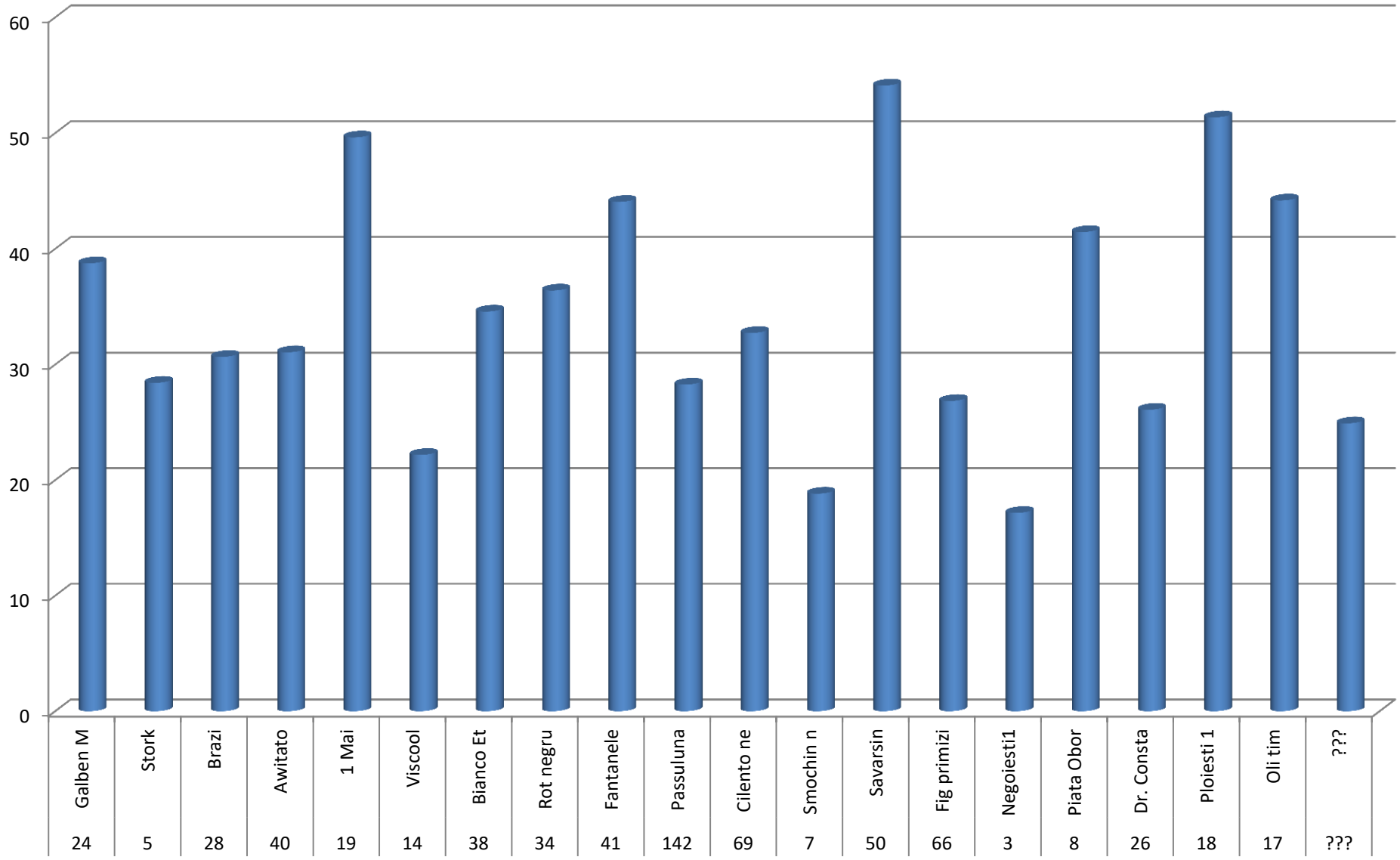


Pomological characteristics

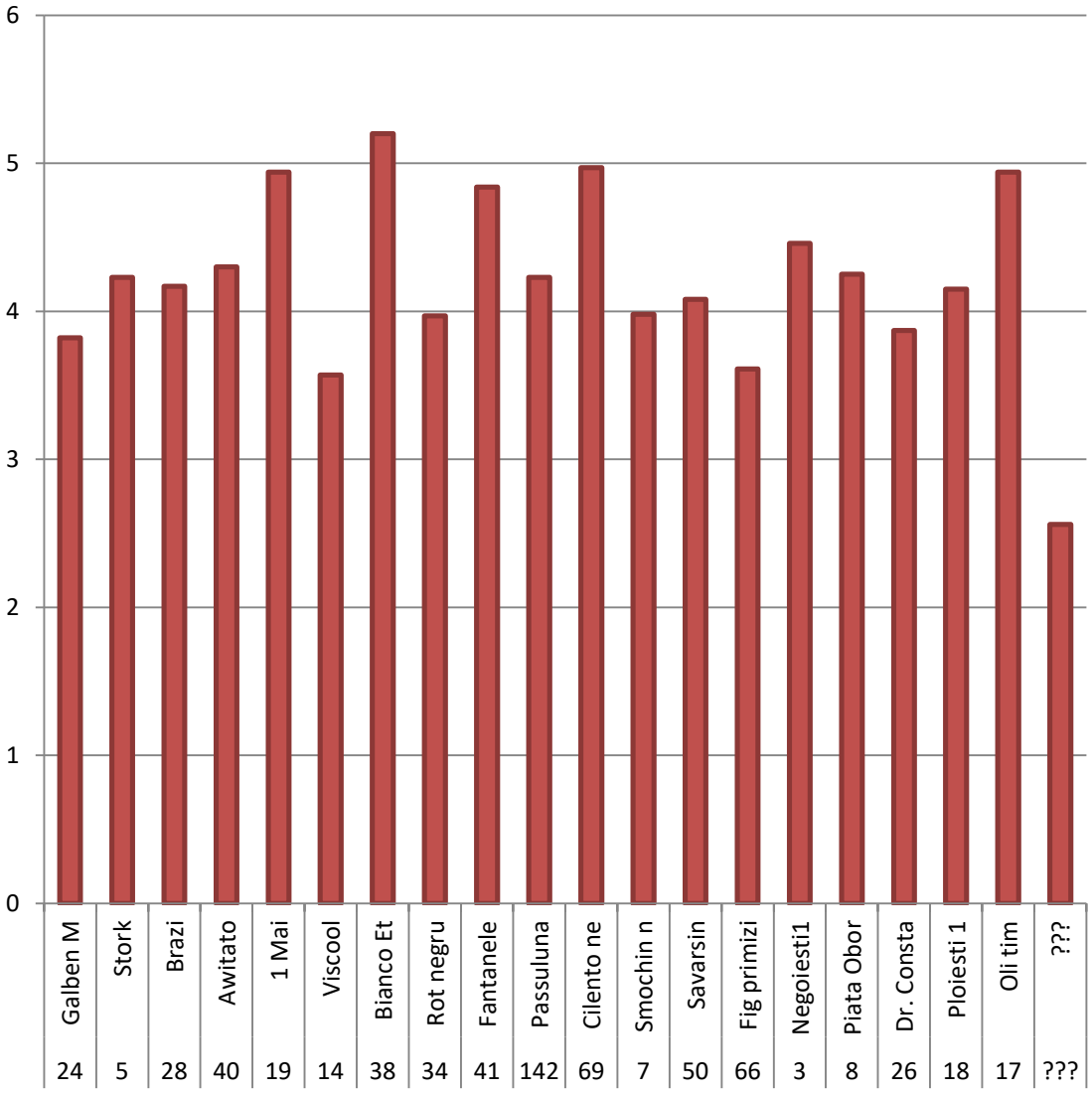
	24	5	28	40	19	14	38	34	41
Fruit	**Galben mare**	**Stork**	**Brazi**	**Awitato**	**1 Mai**	**Viscool**	**Bianco Etna**	**Rot negru otimanu**	**Fantanele Ph**
1. Fruit width	42.07	38.47	37.73	35.54	42.64	33.67	37.83	42.95	42.85
D1	43.08	40.51	39.16	36.68	44.31	34.81	38.7	44.31	43.46
D2	41.05	36.43	36.3	34.39	40.97	32.53	36.95	41.58	42.24
2. Fruit length	52.03	52.73	43.59	43.68	50.47	39.47	45.1	42.76	45.16
3. Fruit shape; index (width/length)	oblong	oblong	oblong	oblong	oblong	oblong	oblong	oblate	oblong
4. Fruit shape according to the location of the maximum width	pyriform	short pyriform	short pyriform	pyriform	pyriform	short pyriform	short pyriform	short pyriform	pyriform
5. Fruit shape near the stalk	acut	acut	acut/round	acut	flat	acut	acut	acut	round
6. Fruit symmetry according to the vertical axis	yes	no	yes	slightly asimetric	slightly asimetric	yes	yes	yes	yes
7. Uniformity of fruit size	yes	yes	yes	yes	yes	yes	yes	yes	yes
Neck and stalk									
10. Fruit neck length (mm)	12.26	18.94	8.85	4.84	no	7.28	no	7.79	no
12. Shape of the fruit stalk	long slender	short slender	long slender	long slender	long slender	long slender	long slender	long slender	long slender
Ostiole and drop									
17. Ostiole colour	pink	pink	white	white	pink	brown	white	red	pink
18. Resistance to ostiole-end cracks	susceptible	intermed	intermed	intermed	intermed	intermed	susceptible	resistant	intermed
Skin									
21. Ease of peeling	no	no	no	yes	no	no	no	no	no
22. Fruit ribs	intermed	slightly	slightly	intermed	no	intermed	no	intermed	no
23. Fruit skin cracks	minute	minute	no	no	minute	longitudin	no	minute	longitudin
24. Resistance to cracks	susceptible	intermed	susceptible	resistant	intermed	intermed	susceptible	intermed	intermed
27. Fruit skin ground colour	green-yello	light-gree	light gree	yellow	yellow-gre	brown -gre	light-gre	light-gree	light-gree
28. Shape and colour of the overcolour	yellow	brown-gre	yelloe	yellow	brown-gre	brown	yellow	brown-gre	brown-gre
Lenticels									
29. Fruit lenticels quantity	no	no	no	no	scarce	scarce	no	scarce	scarce
30. Fruit lenticel colour					white	white		white	white
31. Fruit lenticel size					medium	medium		small	medium
Flesh									
33. Pulp internal colour	pink-amber	red	pink	amber	pink	red	amber	red	pink
34. Pulp texture	coarse	coarse	medium	medium	medium	coarse	fine	coarse	fine
35.Taste	medium sweet	medium sweet	medium sweet	very sweet	sweet	medium sweet	very sweet	medium sweet	sweet

	142	69	7	50	66	3	8	26	18	17	
Fruit	**Passuluna nero**	**Cilento nero**	**Smochin negru**	**Savarsin**	**Fig Primizia**	**Negoiesti 1**	**Piata Obor**	**Dr. Constantinescu**	**Ploiesti 1**	**Oli Timisoara**	**??? R3P13**
1. Fruit width	35.05	38.3	31.22	43.23	35.35	34.87	41.26	35.43	44.12	40.79	35.6
D1	36.38	39.42	32.28	44.43	35.58	30.73	42.45	36.31	45.13	41.11	35.6
D2	33.71	37.18	30.15	42.03	35.11	39	40.06	34.54	43.1	40.46	34..45
2. Fruit length	36.53	38.8	31.36	44.43	40.97	28.67	42.21	42.07	53.26	55.55	44.59
3. Fruit shape; index (windth/length)	globose	globose	globose	globose	oblong	oblate	globose	oblong	oblong	oblong	oblong
4. Fruit shape according to the location of the maximum width	short pyriform	short pyriform	short pyriform	pyriform	pyriform	short pyriform	pyriform	short pyriform	pyriform	pyriform	pyriform
5. Fruit shape near the stalk	round	round	round	flat	acut	acut	round	acut	round long	flat	acut
6. Fruit symmetry according to the vertical axis	yes	yes	yes	slighly asimetric	yes	yes	slightly asimetric	yes	yes	yes	yes
7. Uniformity of fruit size	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Neck and stalk											
10. Fruit neck length (mm)	no	no	5.14	no	no	no	no	7.43	no	no	6.65
12. Shape of the fruit stalk	long slender	long slender	short slender	long slender	long slender	short slender	short thick	long slender	short thick	long medium	long slender
Ostiole and drop											
17. Ostiole colour	pink	brown	pink	pink	white	white-pink	red	white	pink	red	white
18. Resistance to ostiole-end cracks	intermed	intermed	intermed	intermed	resistant	resistant	susceptible	itermed	intermed	resistant	intermed
Skin											
21. Ease of peeling	no	no	no	no	no	no	no	no	no	no	no
22. Fruit ribs	intermed	yes	yes	yes	yes	no	no	intermed	no	no	intermed
23. Fruit skin cracks	no	no	minute	minute	minute	no	minute	minute	intermed	minute	minute
24. Resistance to cracks	resistant	resistant	intermed	resistant	intermed	resistant	intermed	intermed	intermed	intermed	intermed
27. Fruit skin ground colour	green ligh	green ligh	yellow-gre	light gree	yellow	yellow-gree	light-gree	light-gree	yellow-gre	light gree	light gre
28. Shape and colour of the overcolour	purple-gre	purple-gre	brown-gre	brown-gre	yellow	brown-gree	light-gree	yellow-gre	brown-gre	brown-gre	yellow
Lenticels											
29. Fruit lenticels quantity	intermed	scarce	scarce	sarce	no	intermed	no	no	scarce	no	no
30. Fruit lenticel colour	white	white	white	white		white			white		
31. Fruit lenticel size	medium	small	small	small		medium			medium		
Flesh											
33. Pulp internal colour	red	pink	red	amber	amber	pink	amber-pink	amber	amber	pink	amber
34. Pulp texture	medium	medium	coarse	fine-med	fine	coarse	fine-med	medium	fine	fine-med	medium
35. Taste	Very sweet	Very sweet	medium sweet	medium sweet	very sweet	medium sweet	medium sweet	sweet	sweet	medium sweet	sweet

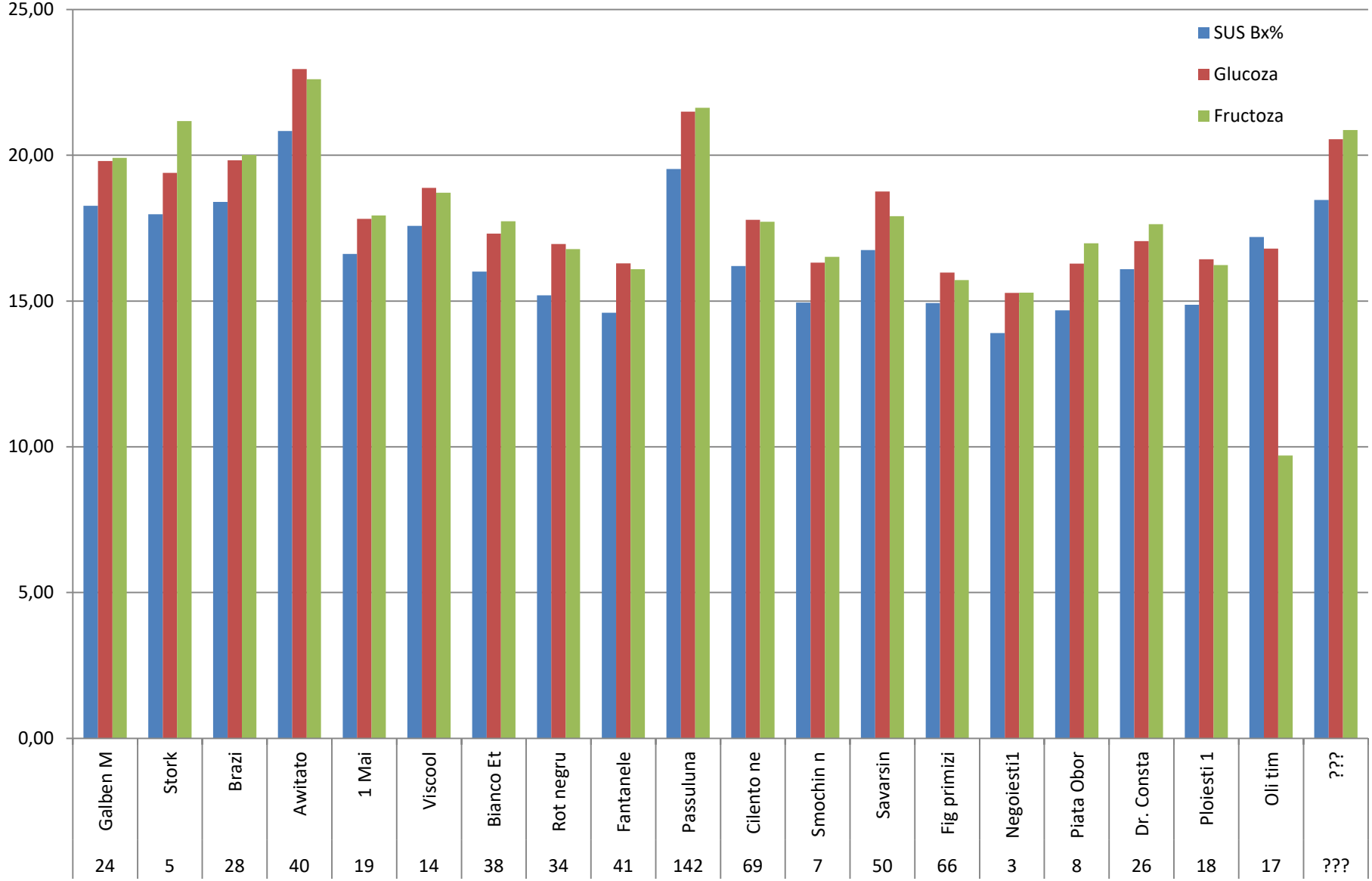
Average fruit weight (g)



Ostiole (mm)


6
5
4
3
2
1
0
Galben M 24
Stork 5
Brazi 28
Awitato 40
1 Mai 19
Viscool 14
Bianco Et 38
Rot negru 34
Fantanele 41
Passuluna 142
Cilento ne 69
Smochin n 7
Savarsin 50
Fig primizi 66
Negoiesti1 3
Piata Obor 8
Dr. Consta 26
Ploiesti 1 18
Oli tim 17
??? ???

Fruit biochemical determinations (%)



IV. Conclusions and recommendations

The most early genotypes were: Galben mare, Brazi and Viscool, all of them had the first harvest in the first decade of August.

Because the rows of plants were planted in different years, the comparison of the growth vigor was performed only on plants from the same row, so:

- R4, planted in 2017, the smallest growth was in the following genotypes: Brazi, the biggest in Bianco Etna, Stork and Galben mare genotypes.
- R3, planted in 2018 , the smallest growth was in the following genotypes: Savarsi and Bianco Sicilia, the biggest in Cilento nero and Passuluna nero genotypes.

The biggest fruits are of the following genotypes: Savarsin-54,11g, Ploiesti nr.1-51,36g,
1 Mai-49,63g, Oli Timisoara-44,18g, Fantanele 44-06g, Piata Obor-41,45g.

The smallest ostiole opening have Viscool and Fig Primizia genotypes.

The highest amount of sugar was found in Awitato and Passuluna Nera genotypes.

Following this year's observations, 5 genotypes were removed from the culture, all of foreign origin.

Melo nero – Italy, did not develop fruits

Bifera bianco – Italy, developed a lot of fruits, but in the beggining of September, when the fruits are the olive size, all of them fell down.

Natawa – Italy, developed a lot of fruits, but the fruits at the consumption maturity are very small, the size of an olive.

Irak 1 – Irak, did not develop fruits

Fiorone Etna – Italy, did not develop fruits

All plants originated from figs in Romania have had a good evolution and will be monitored in the coming years.

There are plants originated from Italy, such as Awitato, Bianco Etna, Passuluna nero, Cilento nero which have had a good evolution, with a very tasty fruits and good cracking resistance. The evolution of these plants will be monitored in the coming years.